Materials Engineering Branch

TIP*

No. 007 Outgassing and Total Mass of the Source

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The choice of a material that meets the vacuum outgassing requirements of less than 1.0%TML and 0.1%CVCM does not necessarily guarantee that contamination levels will remain within reasonable limits during test and/or in flight. Calculations must be made based on the total weight of each material used to approximate the amount of contaminant that can be expected to outgas.

In some cases, such as from solar arrays, thermal blankets, wiring harnesses and painted surfaces, the outgassing can be expected to be appreciable even though the materials of construction are within the above acceptable limits. This is due to the fact that the amount of material that is outgassing is substantial. Therefore, an alcohol wipe and a bake out of these items prior to integration would be strongly advisable. In the case of thermal blankets, the individual components should be baked out individually prior to assembly and installation.

The temperature of the bake out should exceed the temperature expected in flight but must remain within maximum rated limits of the hardware involved. Adequate monitoring of the bake out with proper sensors, such as a quartz crystal microbalance, (QCM), witness plates or mirrors, etc. will assist in determining the duration of the bake out.